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EX ANTE LIABILITY RULES IN NEW ZEALAND'S HEALTH AND SAFETY IN EMPLOYMENT ACT: A LAW AND ECONOMICS ANALYSIS

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ABSTRACT. In addition to penalties imposed for breaches of statutory duties in the event of workplace accidents involving physical harms, New Zealand's Health and Safety in Employment Act 1992 also provides for penalties where accidents have not occurred. Ordinary negligence rules are ex post in that both an accident and harm must occur before liability accrues, whereas ex ante liability rules create liability for deficient care per se. This paper examines whether liability for breaches of duty that do not give rise to accidents have a useful incentive-enhancing role for health and safety decisions by employers in the New Zealand context when used in conjunction with ex post liability rules. We argue that ex post rules by themselves are insufficient to induce appropriate levels of precaution due to the combined presence of weak penalties and considerable uncertainty surrounding the Courts' required standard of care. Merely augmenting ex post liability with ex ante liability, however, is unlikely to induce desirable levels of employer precautions. Further, more strict ex ante standards than socially optimal precaution levels may be desirable since inspection probabilities, prosecution rates, and penalties for breaches of ex ante standards are relatively low, providing some justification for the relatively stringent safety regulations and required standard of care observed in New Zealand. Nevetheless, a weaker but less uncertain standard may instead induce a small degree of overprecaution, removing the need for ex ante regulations from this particular perspective.

Keywords: *ex ante* and *ex post* liability; safety incentives, health and safety standards; uncertainty.

JEL Classification: K32.

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1. Introduction

Given that the vast majority of potential common law tort claims involving personal injury remains barred under New Zealand's accident compensation legislation, an important development with respect to creating incentives for workplace safety has been the Health and Safety in Employment Act 1992 ("HSE Act" or "the Act"). The Act, which replaced a vast array of regulations and statutes which encompassed both prescriptive and proscriptive approaches, establishes statutory duties on both employers and employees to regulate workplace risks, with sanctions following from detection of substandard levels of care. Part II of the Act establishes duties, and while employees have duties under s 19 to protect themselves (and others), s 6 emphasises the onus on employers to identify hazards faced by employees and to deal with them. Further, in addition to penalties imposed on non-compliers in the event of accidents involving physical harms, the Act also provides for *ex ante* liability, i.e., penalties in the event of non-compliance even where accidents have not occurred. In what follows, and building on some of our previous work,[1] we use a law and economics perspective to examine whether breaches of statutory duties created by the Act but which do not give rise to actual accidents may have a useful incentive-enhancing role when used in conjunction with *ex post* liability rules.

We argue that *ex ante* liability has a potentially important role in complementing *ex post* liability rules where the latter are insufficient to induce appropriate levels of precaution due to the combined effects of weak penalties and where there is considerable uncertainty surrounding the Courts' required standard of care. *Ex ante* liability raises expected penalties and safety standards can send signals

[1] Cf., Gordon and Woodfield (2001).

to employers as to the Court's bottom-line level of precaution, reducing the dilution in incentives to take care due to uncertainty surrounding the implementation of *ex post* liability rules. While the literature suggests that *ex ante* standards should be lower than the corresponding socially optimal precaution levels, we argue that more strict standards may be necessary if, as is observed in the enforcement of the Act, both penalties and inspection probabilities are relatively low. And while amendments to the Act in 2002 permit maximum fines to be five times greater than previously, the substitution of reparations for fines under the Sentencing Act 2002, hesitancy by the Courts in making proportionately greater increases in financial penalties, and a continued adherence to capped fines at levels well below the value of accident losses maintains a case for relatively stringent *ex ante* safety standards.

The structure of the paper is as follows. Section 2 reviews the efficiency of negligence-based liability rules under certainty and examines the implications of augmenting *ex post* liability with *ex ante* liability when penalties are set at non-optimally low levels. Section 3 examines the possible complementarity of *ex ante* and *ex post* liability rules when uncertainty surrounds the legal interpretation of the required standard of precaution. Section 4 considers the interpretation of the *ex ante* safety standards that accompany the Act, and section 5 examines their economic rationale. Section 6 addresses issues of uncertainty in respect of the standard of care required under *ex post* liability in New Zealand, and section 7contains some concluding remarks.

2. Augmenting *Ex Post* Liability Rules

The statutory duties required of employers under the HSE Act bear a strong superficial resemblance to those required under the common law negligence rule. For

example, the Occupational Safety and Health Service of the Department of Labour ("OSH" and "DOL", respectively) (2003, p.20) argued that "… the Act imposes a similar duty of care to that of the common law to protect people at work from hazards and maintain safe and healthy workplaces." The desirable efficiency properties of the *ex post* negligence rule under certainty in a unilateral-care framework in which only employers can vary their level of safety precaution, where levels of employer activity are exogenous and where employers and employees are assumed to be risk-neutral, are well-established.[2] Here, we initially assume that an employer's statutory duties mimics the standard of care required under a negligence rule. Unlike this rule, however, the Act provides for *ex ante* liability even when no accident occurs. Accordingly, we modify the standard negligence model as follows. Suppose that an employer minimizes the sum of the costs of care and expected liability payments, where the latter include expected liability from breaching the due care standard even where no harms are suffered. Assume that the fine in the event of an accident where the due care standard is breached is a given proportion α of the harm suffered *ex post* an accident, and that the fine where the standard is breached but no accident occurs is a given proportion β of the *ex ante* expected harm. The employer chooses the level of care x to minimize $C(x) + (\alpha + \rho\beta)A(x)$, where $C(x)$ is the employer's cost of care function, with $C(0) = 0$, $C_x(x) > 0$, and $C_{xx}(x) > 0$, $A(x) = p(x)D(x)$ denotes expected accident losses (where p (x) is the probability of an accident generating employee harm $D(x)$, with $A(0) > 0$ and $A_x(x) < 0$), and where ρ is the probability of detection

[2] The earliest treatment is due to Brown (1973); see Miceli (1997) for a general treatment of the efficiency of various liability rules. One justification for following the unilateral-care approach is that of tractability, while another would be the maintained hypothesis that employees always take optimal levels of care. Neither justification, however, is compelling. Another justification is the clear focus in the Act on the conduct of the employer. The judgment in *Moore v Department of Labour*, unreported HC Christchurch, 5 July 2001, A 50/01, for example, emphasizes a "hierarchy of responsibility", while the employee's level of care has been interpreted as relevant only as a mitigating factor in setting the appropriate fine on a careless employer; *Department of Labour v de Spa* [1994] 1 ERNZ 339.

and subsequent conviction for breach of the duty of care where no harm eventuates. The first-order condition implies that $C_x(x) = -(\alpha + \rho\beta)A_x(x)$, and the employer sets the privately optimal level of care at a level that equates the marginal cost of care to a given proportion $(\alpha + \rho\beta)$ of the reduction in expected accident losses arising from that additional care.

If the objective is to minimize the sum of care costs and expected accident losses, the socially optimal amount of care taken by the employer, x^*, satisfies the first-order condition $C_x(x^*) = -A_x(x^*)$ requiring $\alpha + \rho\beta = 1$. The special case of $\alpha = 1$ and $\rho\beta = 0$ is consistent with the standard *ex post* negligence rule. If x^* is also the standard of due care so that employers are fully liable for the costs of accidents they cause when they fall below this standard, an employer's problem is to minimize $C(x)$ for $x \geq x^*$, and to minimize $C(x) + A(x)$ for $x < x^*$. The employer sets the privately optimal care level at $x^0 = x^*$ since for $x > x^*$, the employer will not be found negligent and care costs can be reduced by lowering x to x^*. If $x < x^*$, the employer will be found negligent and must bear expected costs $C(x) + A(x)$, and these are necessarily minimized at $x = x^*$.

An *ex post* negligence rule theoretically induces employers to take the socially optimal level of care. Distorted incentives, however, may arise from a variety of sources. For example, employers may assess a positive subjective probability of not facing suit, or the legal system may not perfectly enforce the liability rule.[3] In principle, distortions of these types can be removed by a suitable upward adjustment in penalties so that employers face the true level of expected accident losses.[4] The implication, however, is that fines should typically exceed the corresponding values

[3] Liability for some employers may also be limited by their bounded asset values.

[4] For simplicity, we assume here that breaches of the standard involving accidents are always successfully prosecuted. Our general arguments that follow, however, will be strengthened if this is not the case.

of accident losses, whereas it is arguable that New Zealand courts have typically imposed fines that fall substantially short of such losses, and that increased financial penalties resulting from the

combined passage of the Sentencing Act 2002 and the amendments to the HSE Act have attenuated, but not removed, this problem.[5] *Ceteris paribus*, the outcome of setting inadequate penalties is that insufficient safety precautions will typically be taken by employers.[6]

A dilution of incentives to take sufficient care might then be compensated by creating *ex ante* liability for breaches of the care standard that are not grounded in an accident. Thus, if $0 < \alpha < 1$ and $0 < \rho < 1$, for the employer to choose the socially optimal level of care it must be that $\beta^* = (1 - \alpha)/\rho > 0$. Further, β^* is clearly decreasing in both α and ρ. If α and ρ are both relatively small, however, β^* will need to be relatively large, perhaps well above unity. It is arguable that in practice both α and ρ are substantially less than unity, that required values for β^* are typically much greater than 1, and that actual values of β are not only less than 1 but are also less than α.[7] First, regarding α, the presence of a cap of $50,000 on fines for successful prosecutions of the predominant s 50 offences during the first decade of the application of the Act literally prevented some fines being set at the level of very serious harms. Second, consider *Department of Labour v de Spa and Co Ltd.*, the

[5] The DOL Health and Safety Prosecution Database (unpublished), records that between 1 April 1993 – 30 June 2002, the average fine across the 1217 cases prosecuted was only $6,678, with the largest fine of $60,000 imposed in 1995. During this period, the largest fine for a single charge was $50,000, imposed during 2002. The combined effects of the 2002 amendments to the Act and the application of the Sentencing Act led to an approximate doubling of average financial penalties through December 2004, while the largest fine to date ($55,000) for a single charge was imposed during 2005. Recent evidence suggests that imposed penalties are increasing somewhat. See Gordon and Woodfield (2006) for an analysis of prosecutions, fines, and reparations since the inception of the Act.

[6] Thus, in the only empirical study of the impact of the Act to date (using dynamic panel data methods), Maré and Papps (2000-02) do not find significant impacts of OSH interventions on the likelihood of subsequent workplace accidents in their preferred specifications.

[7] For $\beta^* \leq \alpha$ to be satisfied, the condition is that $\rho \geq (1 - \alpha)/\alpha$. If $\alpha \leq \frac{1}{2}$, ρ must be no less than 1, which is infeasible. Even if α is quite close to 1, the critical value of ρ for the condition $\beta^* \leq \alpha$ to be satisfied may still be larger than observed.

leading case on the principles in setting fines under the Act.[8] According to Tipping and Fraser JJ, the maximum penalty is designed to be applied to the "worst possible case", yet sentencing experience suggests that the "worst" case will always be waiting in the wings. While leaving some margin for deterrence is generally efficient, the effect of relatively low caps on fines is to discount penalties on less serious cases when employer culpability is lower even though the harms are considerable. In *de Spa*, an employee was fatally crushed by a moving bar while a wool bale elevator was in operation. Holderness J held that the defendant ought reasonably to have anticipated that an employee might decide on the spur of the moment and without thinking, to look down the elevator shaft, especially since there was nothing in place to discourage the action. A fine of $6,500 was imposed on the employer, but, on appeal, this was considered to be manifestly inadequate and was raised to $15,000. This amount, however, represented only 30 per cent of the maximum fine which in turn was arguably a very small proportion of the loss.[9]

Regarding the magnitude of ρ, the probability of detection and conviction for deficient employer care not resulting in accidents, note first that OSH (as it was then) distinguished pro-active compliance assessments of workplaces from OSH-reactive investigations of the safety status of workplaces in their Health and Safety Accident Reporting Database ("HASARD", unpublished) for the years ending 30 June 1999 and 30 June 2000. The annual average number of geographic units of economically

[8] Supra, fn. 2.

[9] No precise estimate of the magnitude of the loss is provided here, but the following is noted. First, the accident resulted in a fatality. While it is impossible to compensate a fatally injured worker, an employer could be made liable for whole or part of the value of a statistical life. Adapting some international willingness-to-pay/willingness-to-accept measures of mortality risk to New Zealand, Access Economics (2006) reports a "conservative" estimate for the value of a statistical life of $3.9 million for 2003 (the mean estimate being $6.9 m.), representing an estimated value per life year of $184,216 using a discount rate of 3.8 percent and a 40 year life expectancy. In comparison, even the increased fine on appeal in *de Spa* is merely a drop in the bucket, reflecting the very low statutory cap on fines and the Court's assessment of the seriousness of the offence. Nevertheless, employees may be compensated at least in part if earnings, *ceteris paribus*, are higher in relatively high-risk sectors of the economy.

significant enterprises recorded in the New Zealand Business Demographic Statistics by Statistics New Zealand was 295,540 over a similar period. The annual average number of reactive visits of 7,281 represented a visitation rate of 2.26 percent, while pro-active visits averaged 9,129, a visitation rate of slightly above 3 percent. This data suggests that OSH pro-actively visited only about one workplace in thirty-three in a given year from the viewpoint of checking compliance with the Act. Further, follow-up visits may occur when compliance failure is detected. The rate of second visits provides an indication of the probability of detecting substandard care among initial visits, although it is probably a downward-biased estimate. For example, the HASARD database recorded that for the period 2002-2004, the average annual number of tasks recorded against closed assessment cases was 15,205, of which approximately one-quarter represented follow-up visits. Reactive visits, however, are clearly non-random, involving investigations in response to notified accidents, incidents, or complaints, and were somewhat fewer than one workplace in forty-five.[10] Both pro-active and reactive visits may give rise to the issuing of verbal directions, improvement notices, or prohibition notices; such directions and notices were issued to 2.64 percent of business units, on average, over 1998-2000. Prosecutions were fewer than one workplace in two thousand, on average, during this period.

Prosecution data regarding health and safety violations are revealing to the extent that they reflect the relative sizes of the probability of *ex ante* detection and the probability of an accident, conditional on violations being prosecuted. The DOL Health and Safety Prosecutions Database (unpublished) records charges laid for HSE Act offences over the period 1 July 1994 – 30 June 2005 as follows:

[10] It should also be noted that proactive visits tend to target sectors for which accident probabilities are relatively high, e.g., the construction sector, a policy that reduces expected liability for firms in industries deemed not to be inherently accident-prone.

I.	Following Accident	2387	II.	Following Incident	191
III.	Following Complaint	134	IV.	Following Inspection	382

Prosecutions totalled 3094 over this period. *Ex post* liability, however, would be appear to be triggered only by I which are the only cases where personal injury has occurred. In contrast, II, III, and IV are classified as examples of detection *ex ante*.[11] This data suggests the following estimates; viz, given a prosecution, the probability that it was *ex post* an accident is 0.77 and the probability that it represented *ex ante* detection is 0.23.[12]

While it is not possible to derive the probabilities (conditional on a prosecution) of either an accident or *ex ante* detection,[13] their relative probabilities may be derived as $p(x)/\rho(x) = 0.77/0.23 = 3.35$. This estimate should be treated with suitable caution, but this sample result strongly suggests that the probability of an accident (given deficient care) is significantly greater than the probability of detection of that deficient care. Since deficient care does not necessarily lead to an accident, $p(x)$ is likely to be substantially less than 1, and, given the limited resources devoted to *ex ante* detection, ρ seems to be only about one third of the likelihood that deficient care results in an accident.[14] If this estimate is anywhere in the ball park, employers will be expected to discount penalties significantly associated with convictions for

[11] In practice, the distinction between *ex ante* and *ex post* detection may be less clear than implied by our classification, particularly for latent health problems.
[12] The ratio of prosecutions where accidents occurred to total prosecutions appears highly stable when annual data is investigated.
[13] This would require, *inter alia*, data for the absolute number of workplaces with deficient care levels and the total number of accidents, neither of which are available.
[14] Given an accident associated with a deficient level of employer care, even one involving serious harm, the probability that it will be reported, investigated, prosecuted, and a conviction obtained is also likely to lie below unity.

breaches of *ex ante* safety standards.[15]

An implication is that if an *ex ante* rule were used in place of an *ex post* rule for which the standard of due care is set optimally and liability properly reflects harms suffered, the fine should be set at somewhat more than three times that of the expected accident costs resulting from (deficient) care level x.[16] The Act, however, augments (rather than replaces) an *ex post* rule with low penalties with an *ex ante* rule accompanied by a low detection probability and even lower penalties. Our view is that prior to the 2002 amendments to the Act (and subsequent thereto, for that matter), expected penalties were still likely to be far too low to produce optimal deterrence.[17] For example, if as much as ninety percent of harms suffered in workplace accidents that resulted from deficient care were reflected in fines, given $p(x)/\rho\ (x) = 3.35$, the probability of an accident resulting from deficient care would have to be as high as approximately one third if a similar ninety percent of (potential) harms (i.e., $\beta^* = \alpha$) were to be reflected in fines in cases where accidents do not occur in spite of deficient

[15] Penalties will be further discounted if conviction rates for breaches of *ex ante* safety standards are smaller than for successfully prosecuted accidents. Analysis of the DOL Health and Safety Prosecutions Database reveals that for all prosecuted charges up to 31 December 2004, conviction rates for accidents and the most common non-accident prosecution source, viz, inspections, were much the same (70 percent versus 69 percent), whereas conviction rates for the less common sources of complaints and incidents were significantly lower at 61 percent and 58 percent, respectively.

[16] If accident cases were never prosecuted, further resources for *ex ante* detection would be available. The allocation of resources between *ex post* and *ex ante* detection and prosecution appears an interesting, unexplored problem. The dominance of convictions for breaches involving accidents likely reflects a rational response since detection costs (at least for notified serious accidents) are negligible. Reporting rates, however, appear relatively low. DOL considers that only about 25 – 35 percent of notifiable accidents are reported, although the notification rate has been increasing in recent years (personal communication from Rex Moir, an officer of DOL). Thus, random inspections may also detect some unreported accidents or incidents or grounds for valid complaints that were never made.

[17] In *Department of Labour v Castlerock Group Ltd*, unreported, DC Auckland, 12 February, 1999, CRN 800404817-178, the defendant company was fined a relatively large total of $21,000 on four charges when employees were continued to be permitted to work in dangerous conditions on a construction site. An improvement notice had been ignored and two prohibition notices had previously been served. Culpability was found to be high, and the company's safety procedures were found seriously wanting. The company's position was that health and safety systems were not cost-effective, yet the probability of prosecution and conviction was likely to be much higher than average since the company must rationally have anticipated that OSH would most likely follow up its notices to determine whether compliance had occurred. More generally, the probability of prosecution appears to be much less than the probability of detection of breaches, given that prosecution appears to be viewed as a last straw. This further weakens the deterrence effect of the Act.

care by employers. For more realistic lower accident probabilities, fines for deficient care not resulting in accidents would have to exceed 100 percent of harms suffered, typically very substantially so. And for more realistic examples where the percentage of harms resulting from accidents involving deficient care are reflected in fines is considerably less than 90 percent, it is easily checked that plausible resulting values of β^* could never be less than α, and typically massively exceed unity.[18] In practice, however, the average fine when deficient care did not produce an accident was less than half the average fine when deficient care caused harm. In consequence, in spite of employers being penalized for breaches of duty whether or not they caused harms to workers, and in spite of recent increases in maximum and actual financial penalties, we argue that expected penalties typically lie significantly below the value of expected harms so that it would be unlikely to expect a comprehensive socially optimal level of deterrence of unsafe practices on these grounds.

3. Complementary *Ex Ante* and *Ex Post* Liability Rules Under Uncertain Legal Standards

In Section 2 above, we argued that employer under-precaution may have resulted in many circumstances because penalties fail to properly reflect actual or potential workplace harms. In addition, however, employer under-precaution may arise when employers are uncertain about the level of care required by the courts. In this context, Shavell (1984) emphasized the possible complementarity of combined *ex ante* and *ex post* mechanisms for preventing the dilution in incentives to take care. Building on earlier work of Calfee and Craswell (1984) and Craswell and Calfee

[18] For example, for $\alpha = 0.50$ and where a deficient level of care x would generate an accident probability $p(x) = 0.05$, $\beta^* = 31.70$, and is as large as 7.93 even when the accident probability is as high as 0.20. In the extreme case where deficient care is guaranteed to result in an accident, β^*still exceeds 1 in this example.

(1986), Kolstad et al. (1990) developed a fairly general model of legal rule uncertainty which will be followed closely in an attempt to justify some of the *ex ante* liability characteristics of the HSE Act.

In Kolstad et al., the legal standard is parameterized by the court's view, which is only revealed subsequent to a litigated (or, in New Zealand's case, prosecuted) accident. At the time of making decisions about appropriate levels of precaution, employers seeking to minimize their expected private costs of care and liability are uncertain about how a court might subsequently evaluate these decisions. Employers, therefore, may not know the legal standard required by the court until after accidents occur, and may make errors in estimating the court's standard.

An employer has a subjective probability distribution q over the standard of care required by the court, and, if a negligence rule applies, will choose the socially optimal level of care x^* as the estimated mean of the distribution q when the court's interpretation of the legal standard is perceived to be unbiased. In this case, for a plausible class of mean-preserving distributions, Kolstad et al. establish that under *ex post* negligence and a legal standard with an expected value of x^*, the employer will take insufficient (excessive) precaution if uncertainty regarding the legal standard is sufficiently large (small). In the case of diluted incentives, if an employer slightly under-complies with the legal standard, liability is the same as if under-compliance had been greater, i.e., when the employer spends much less in taking safety precautions. In deciding whether to increase or decrease precaution from x^*, the employer must trade off the marginal cost of precaution against the expected marginal benefits in the form of the sum of expected marginal accident costs and the change in the likelihood of being found liable. When there is a great deal of uncertainty

surrounding the legal standard of care, significant under-compliance greatly reduces precautionary costs while only slightly increasing expected liability costs.

Regarding the case where the employer views the mean of the distribution q as differing from the socially optimal level of care x^*, in these circumstances the bulk of the probability mass lies either below or above x^*. Employers believe courts consistently over-estimate or under-estimate the socially optimal level of care. For a plausible class of variance-preserving distributions, Kolstad et al. then establish the result that under *ex post* negligence, if the mean of the employer's subjective probability distribution of the legal standard q is sufficiently small (large) relative to the socially optimal level of care x^*, the employer will take insufficient (excessive) levels of precaution. In the case of diluted incentives, if the firm perceives the expected legal standard to be sufficiently less than the social optimum, the injurer will under-protect workers. Even with significant under-protection, the employer is unlikely to be found negligent, so that significant savings in the costs of taking care can be obtained with little additional expected liability payments.

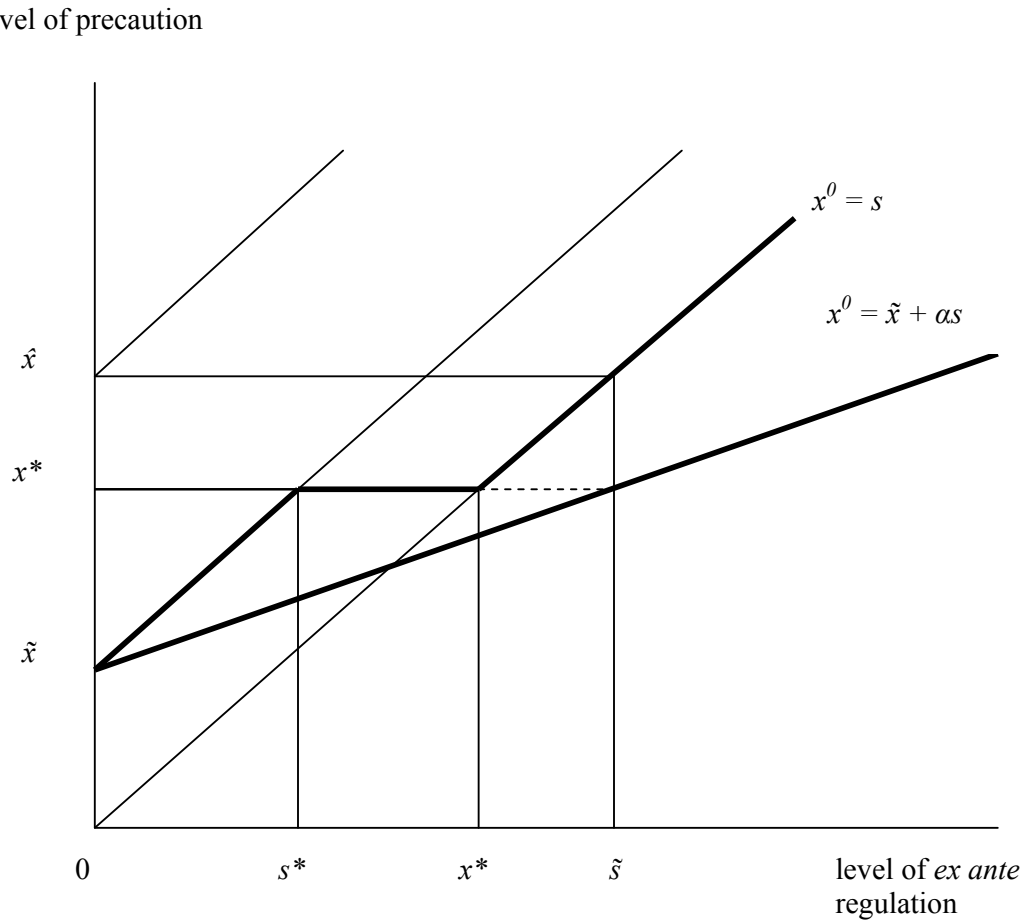
Under-precaution motivates the introduction of *ex ante* regulation of risk, and Kolstad et al. demonstrate that safety regulation *ex ante* may be used to augment *ex post* negligence rules and, if chosen appropriately, can eliminate the problem of diluted incentives. *Ex ante* regulations typically specify a minimum acceptable level of precaution, $\tilde{s}$. Kolstad et al. assume that *ex ante* standards are defined precisely and are enforced with certainty, on the grounds that the sanctions for non-compliance are typically sufficiently high for firms never to choose a level of precaution lower than the minimal level specified. In these circumstances, the employer estimates the strictest legal standard before choosing the level of care that minimizes the employer's private costs. Since the employer knows the *ex ante* standard with

certainty, the legal standard cannot be less than this *ex ante* standard. The legal standard, however, may be perceived as being greater than the *ex ante* standard.

The introduction of *ex ante* regulation is then represented by a truncation at the lower tail of the employer's subjective distribution on the strictest legal standard. With safety regulation at level $\tilde{s}$, the employer will not consider precaution below this level. The critical assumption is then made that the probability mass previously lying below $\tilde{s}$ is now distributed above $\tilde{s}$. Kolstad et al. then establish that increasing the minimum acceptable safety level has the effect of increasing the precaution taken.

Given that employers choose deficient levels of care, the question arises as to the level of *ex ante* regulation s^* that induces socially optimal care x^*. Kolstad et al. establish that with certainty of enforcement of the legal rule, while tightening the regulation increases the privately optimal level of precaution, the socially optimal amount of *ex ante* regulation is less than the optimal level of precaution. This result is illustrated in Figure 1, which plots the choice of care given the standard of care required by *ex ante* regulation. The privately optimal care level $x^0 = \tilde{x}$ is the care chosen with no *ex ante* liability rule, i.e., only *ex post* liability operates as an incentive. Note that $\tilde{x}$ is less than x^*, capturing the under-precaution taken by employers. With certainty of enforcement, the locus of care choices given an *ex ante* standard at s increases at the same rate as s. This locus is kinked at (x^*,s^*) since for $s \leq x^*$, a choice of care at x^* will satisfy both the *ex post* and *ex ante* rules. For $s \geq x^*$, the choice of care will track the level of *ex ante* regulation one-to-one along the locus $x^0 = s$. This is because satisfaction of the *ex ante* standard will also satisfy the *ex post* standard. The optimal level of *ex ante* regulation where $\tilde{x}$ is the chosen level of

FIGURE 1: REGULATION AND THE CHOICE OF PRECAUTION



precaution with no *ex ante* standard is s^*.[19]

[19] This may be compared with over-precaution (at $\hat{x}$, say, in Figure 1) being the choice of care in the absence of *ex ante* regulation. In these circumstances, the introduction of any *ex ante* regulation induces levels of care further above the optimal level. In this case, the appropriate level of *ex ante* regulation is zero.

4. Safety Standards in New Zealand

If employer under-precaution characterizes the New Zealand situation in the absence of *ex ante* standards, the argument in section 3 above suggest that the safety standards accompanying the Act appear promising as an efficiency-enhancing device. These standards encompass formal safety regulations (along with the historical development of sentences that penalize offenders for breaches of their duties even when accidents do not occur), approved codes of practice, and OSH-approved guidelines. The Health and Safety in Employment Regulations 1995 specify, *inter alia*, the nature of facilities required for workplace health and safety, precautions required in respect of some particular hazards, notifications of hazardous construction and forestry projects, and certificates of competence in some areas of work. Subsequent formal regulations have also been developed for the extractive sector, and for dealing with hazardous machinery or processes. Notably, compliance with regulations is a necessary but not always sufficient condition to meet the duties specified in the Act. Thus, employers are implicitly warned that the legal standard of care may exceed those embodied in the minimum standards given by the regulations.[20] While a comparison of individual regulations, approved codes of practice, and guidelines with corresponding socially optimal care levels is far beyond the present study, legislators clearly consider that regulatory standards do not exceed (and may in certain circumstances fall short of)

[20] Approved codes of practice are preferred workplace arrangements approved by the Minister of Labour, and although they are neither mandatory nor enforceable, they are accepted in Court as evidence of good practice since they are recommended means of compliance with the requirements of the Act. Nevertheless, satisfying the codes may be neither necessary nor sufficient for taking practicable steps; see *Central Cranes Ltd v Department of Labour* [1997] ERNZ 520, while the failure to mention a particular hazard in a code may, but need not, excuse an employer from a duty to identify it; see *Burrell Demolition v Department of Labour* [2002] DCR 795. Guidelines, either developed by OSH or by industry in conjunction with OSH, may not have undergone a formal approval process but are useful in indicating how the Act's requirements might be met. They include controls for specific hazards or recommended practices for particular types of workplaces, and may provide specific guidance on how to meet duties, but have a lesser standing in the law than do approved codes. Nevertheless, guidelines have been referred by the Courts, e.g., *Linework Ltd v Department of Labour* [2001] ERNZ 80, where the failure to comply with industry safety rules that had been adopted was a significant factor in the conviction.

what they accept to be appropriate standards of care for employers. In this respect, the constraints on efficient *ex ante* standards conform to the prescriptions of Kolstad et al.[21]

The general standard of care required for employers to avoid *ex ante* liability, however, is arguably more stringent than that of a negligence standard, requiring "all practicable steps" to be taken to ensure workplace safety.[22] This standard is not identified with all feasible steps, and is qualified in s 2A by employing the phrase "reasonably practicable", defined by reference to the balancing of issues such as gravity of harm, degree of risk, current state of knowledge regarding harms and their avoidance, and the cost of avoidance.[23] At first blush, this appears to approximate a common law duty in the law of negligence. There is, however, strong authority for

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[21] Were *ex ante* standards designed with a view to inducing additional precautionary behaviour by reducing uncertainty surrounding the interpretation of the required general standard of care? There is little evidence of such intent in the report by the Advisory Council for Occupational Safety and Health (1988) that paved the way for the HSE Act, or in subsequent discussion or legislation. Instead, similar to other developments influenced by the report of Lord Robens (1972) in the U.K., *ex ante* interventions in New Zealand have typically placed prosecutions at the top of a pyramid structure (as propounded by Ayres and Braithwaite (1992) among others) that emphasizes influencing behaviour via a sequence of interventions. In New Zealand, these first involve consultation, education, and persuasion prior to moving to warnings, the issuing of improvement or prohibition notices, and (more recently) infringement notices. As a last resort, sanctions are enforced (at relatively high cost) for the most egregious offences. (See Workplace Health and Safety Segmentation and Key Drivers for an illustration of the 'compliance pyramid' for the OSH Strategic Plan 2004-09, available at http//:www.whss.govt.nz/resources/market-segmentation-24-02-04.html). Further, *ex ante* interventions are much more common than their *ex* post counterparts. Some of the early *ex ante* interventions provide advice as to how compliance with the Act might be achieved, and deal directly with employer uncertainty as to the legal standard of care, while others may provide a 'business case' for compliance [Entec U.K. Ltd (2000)], emphasizing employers' potential self-interest in workplace safety. Without denying the possible cost-effectiveness of these actions in achieving compliance, our analysis focuses on the relatively uncommon interventions that involve prosecution and potential employer liability, which, in turn, is traded off against compliance costs. In this context, the Department of Labour (2001) assigns companies on the basis of their being inactive, reactive, or proactive with respect to compliance.

[22] To compare the requirements of the general standard of care and specific regulatory requirements, consider Regulation 10 of the Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999 relating to duties of controllers. Regulation 10(4) specifies a duty precisely in that "Every controller of a limited attendance boiler or an unattended boiler must notify the Secretary before operating the boiler for the first time". Regulation 10(5), however, only involves the general duty of controllers to take all practicable steps to ensure that relevant quality management systems are in place prior to operating such boilers. While much more precise than just the general duty to take "all practicable steps" to ensure workplace safety, the question is clearly begged as to what constitutes all practicable steps such that the regulation (and many others phrased in similar vein) would be satisfied.

[23] HSE Act, s 2A.

the proposition that despite the similarity of the concepts, direct comparisons between the statutory duty and the principles of negligence are of limited value[24] and the weight of authority also favours the proposition that the statutory test is more demanding than the corresponding test in negligence.[25] For example, in *Buchanan's Foundry Ltd v Department of Labour*,[26] Hansen J examined the meaning of the phrase "reasonably practicable" adopted by Asquith LJ in *Edwards v National Coal Board*.[27] In the latter, a defendant could discharge the statutory duty even by rejecting a "practicable step" if there existed a gross disproportion between the magnitude of risk reduction and the cost of reducing that risk. Nevertheless, in economic terms, the socially optimal level of care would require the balancing, at the margin, of the cost of care and the benefits in terms of reduced risks rather than merely rejecting those viewed as disproportionately costly relative to the safety benefits generated.

If the required *ex ante* standard of care exceeds that under negligence, higher levels of worker safety might be expected to be induced since a stringent care standard might compensate for inadequate levels of expected penalties. Unfortunately, this is not always the case. Dilution of penalties reduces the marginal expected penalty below marginal expected harm at each level of care x, inducing too little care relative to the social optimum. Increasing the care standard above the social optimum might induce this standard to be adopted in many circumstances. Some employers, however, may find it better to adopt a relatively low level of care, not only below the standard but below the socially optimal level of care if the resulting increase in expected liability is outweighed by the considerable cost savings obtained

[24] *Marshall v Gotham Co Ltd* [1954] AC 360, followed in *Cox v International Harvester Co of NZ Ltd* [1964] NZLR 376.
[25] *Powley v British Siddeley Engines Ltd* [1966] 1 WLR 729; *Trott v WE Smith* [1957] 1 WLR 1154.
[26] [1996] 1 ERNZ 333.
[27] [1949] 1 KB 704.

at low care levels.[28] Qualifying the care standard as being that of "all reasonably practicable steps" may then prevent the dilution of incentives to take care in favour of accepting less costly accident liability.

The degree of stringency of the general *ex ante* care standard may be illustrated by reference to relevant case law. First, *Martin v. Boulton & Paul (Steel Construction) Ltd*[29] provides authority that a defence of common practice in the law of negligence will not apply under the statutory formula of "reasonably practicable steps". In *Department of Labour v. Eastern Auto Spares (NZ) Ltd*,[30] the defendant company was charged with failing to take all practicable steps to ensure the safety of an employee who was working in the vicinity of leaking oxy-acetylene equipment, and which was known to be leaking by the employee's supervisor. No injury resulted, although the potential for serious injury was considerable. The Court found against the defendant in that once the leak was discovered, it should have acted to reduce the possibility of flashback including the fitting of arrestors, which, although reasonably common, were not mandatory.

In *Mair (Health and Safety Inspector) v Regina Ltd*,[31] an extruder machine was unguarded and an inspector had alerted the defendant company to the hazard, an improvement notice had been served, but no suitable guard was fitted. No accident occurred, but the potential for injury existed if some "unusual" movement occurred. No injury could occur, however, unless such an action was taken by a worker, and which would have been contrary to instructions. Further, the company had installed a chute which acted as a guard but had decommissioned it in response to a complaint

[28] The courts may recognize this by effectively making penalties an increasing function of the size of the discrepancy in the level of care taken relative to the standard, but it is by no means clear that employers will have an incentive to take very high levels of care merely because of a legal requirement to do so.
[29] [1982] ICR 366.
[30] Unreported, DC Auckland, 7 June 1995, CRN 4004066892.
[31] Unreported, DC Dunedin, 4 March 1994, CRN 3045004405.

from employees that it hampered their operational activities. Everitt J found that the company did not treat the prospect of injury with sufficient seriousness, and that "in unusual circumstances injury happens because someone was thoughtless or acted irrationally, knowing full well the danger that was presented to them". The frequency of actions of this nature, however, was not addressed in detail, although their unusual nature was nevertheless central to the issue.

In *Department of Labour v Mark Mayer*, and *Department of Labour v Steel Fabricators Ltd*,[32] an inspector saw a steel erector/rigger walking along a narrow steel beam without any restraint or mechanism to check a fall. A catwalk had been constructed, but the employee chose not to use it. The company was fined $3,000 while the employee was fined $500 for failing to ensure his own safety. In *Hirepool Auckland Ltd v Department of Labour*,[33] the circumstances were similar, and the appellant company would seem to have been obliged to provide resources to check that proper safety equipment was available, installed correctly, and been in continuous use given the proclivity of some employees to elect to bypass its use.

In *Department of Labour v Frews Transport Ltd & Ors*,[34] charges were brought against a company for failing to ensure that a crane (and its operator) was protected from falling objects, and failing to ensure that work was carried out in a safe manner. An employee was in a suspended rubbish skip and his safety harness was not attached, contrary to the relevant code. Hattaway J found that the employer should have ensured that the crane operator was protected with an approved crane-lifted platform and the employee in the skip should have been monitored to ensure that his harness was properly attached. Further, the unsafe work method should have ceased, implying that resources for the detection of the unsafe practices should have been

[32] Unreported, DC Hamilton, 16 February 1995.
[33] Unreported, HC Auckland, 4 February 1997, AP 301/96.
[34] Unreported, DC Christchurch, 22 October 1998, CRN 8009011144-47.

made available. At a later hearing, the company was fined $4,000 on each charge, and the employees fined $250 each, the Court rejecting the argument (in defence) that the risk of injury was "fanciful".[35]

In *Canterbury Concrete Cutting v Department of Labour*,[36] the appellant argued against a conviction on the grounds that their employees had been advised not to climb out of a cherry picker and that safety had been emphasized to them. Further, a supervisor had been present at the beginning of the work, but had not continued supervision during a period where a (passing) inspector observed one worker operating a concrete saw outside the equipment, being supported by his co-worker who was half in and half outside the cherry picker. In the lower court hearing, Holderness J had found the firm in breach of duty to remind the employees prior to starting work of what they had been previously told, and also argued that a supervisor should have been available to be consulted should difficulties have arisen. This decision was upheld on appeal.

In *Department of Labour v Ross Roofing Limited*[37], the defendant company was charged as a principal that failed to ensure that its contractor failed to prevent harm to an employee of the latter. The Court accepted that it would be impracticable for a contractor to be required to stand at the shoulders of its various sub-contractors, and a somewhat unsatisfactory attitude towards safety on the part of the contractor could not have been foreseen by the principal. Against *Ross Roofing*, however, consider *Central Cranes Ltd v Department of Labour*[38] and *Fletcher Construction NZ and South Pacific Ltd v Department of Labour*,[39] two closely-related appeal cases.

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[35] These fines dramatically illustrate where the Courts consider primary responsibility to lie under the Act.
[36] Unreported, HC Christchurch, 13 February 1995, AP 245/94.
[37] Unreported, District Court, Auckland, 6 December 1995, CRN 5044011919.
[38] Supra, fn. 19.
[39] [1996] 2 ERNZ 199 (HC).

The District Court in *Central Cranes* had absolved this company from liability as a principal when workers for a specialist sub-contractor were filmed walking on wires 41 metres above the ground without wearing any safety equipment (which was, however, available). In *Fletcher Construction*, the company had been found liable when two workers employed by a specialist subcontractor had climbed on a roof to complete their tasks rather than use a cherry-picker which the principal and the subcontractor had agreed would be used for the purpose, but which was out of action. Both principals were found liable on appeal, jointly with their respective sub-contractors. Cartwright J found that a principal letting a contract to an employer which did not clearly establish responsibility for safety might bear legal responsibility for ensuring the safety of employees of the agent. If, however, employers permitted unsafe workplace practices, they may also bear responsibility. Neither principal not employer could be absolved because workers had customarily elected to assume personal responsibility for their safety, and both parties had a responsibility not only to ensure that proper equipment was available but also used. For Cartwright J, the fact that workers did not use available safety equipment was seen as a signal that "may well demonstrate either that the employer has washed his hands of responsibility for safety or that the equipment is unsuitable" (at p. 207). Safety equipment, however, can be cumbersome, uncomfortable, and lead to lower productivity, and continuous monitoring of employees may be very expensive. Specialist employees may also be considered the best judges as to what equipment is most suitable for their purposes, and when it should be used.

There is a clear indication from the above cases that employers are considered duty bound to adopt very high standards of care including protecting their employees and the employees of subcontractors against harm including that resulting from

actions of workers which might reasonably be considered negligent, perhaps grossly so.[40] Employer liability, however, is not absolute.[41] Although the Courts have emphasized the practicality of precautions that could prevent an accident at little cost, the magnitude of cost has a bearing on whether employers are likely to be found in breach of their duties under the Act whether or not their employees might have been considered culpable.[42] Nevertheless, an application of conventional cost-benefit calculus may not see an employer safe from charges of breach of duty since all is required is that costs are not "disproportionately" larger than benefits, which in turn are imprecise given the Courts' views as to what constitute significant versus insignificant risks.

5. Do New Zealand's *Ex Ante* Safety Standards Necessarily Induce Over-precaution?

In section 4 above, it is argued that New Zealand's safety standards accompanying the HSE Act are typically more strict than the level of care believed to be optimal under a common law negligence rule. Kolstad et al. argue that an excessively strict *ex ante*

[40] Nicholson and Mrkusich (2006) have gone so far as to suggest that DOL is taking the strict position that the presence of harm is sufficient for a breach of the Act, and that injuries would not occur if all practicable steps were taken.

[41] Thus, in *Buchanan's Foundry*, following a furnace explosion resulting in injury, the prosecution alleged that the employer had supplied deficient and inadequate protective clothing. No available clothing could have protected workers from the serious harm arising, but Judge Erber found that a greater protection from less catastrophic splashing would have been provided by two available brands which the appellants had chosen not to use. Accordingly, the appellants were held to have made an error of judgment that had exposed its employees to a risk of harm and were convicted under s 50. In this case, while an injury occurred, the breach of duty was in respect to exposing employees to excessive levels of risk regarding less serious accidents which did not actually occur. Hansen J, however, allowed the appeal. The evidence established that the selection of clothing would involve a compromise of competing interests, and the District Court judgment had limited considerations to only one hazard inherent in foundry operations. The appellant was not deemed to have acted unreasonably, and some regard was due to the reliance on three previous inspections which had not resulted in the issuing of improvement notices in relation to protective clothing.

[42] The authority is *Marshall v Gotham Co Ltd* (supra, fn. 22) where the cost of shoring up roofs throughout a mine in order to avoid an unusual geological fault would have led to the mine's closure order to avoid an unusual geological fault would have led to the mine's closure. The measure was held not to be reasonably practicable.

standard will induce over-precaution.[43] In this section, we argue instead that stringent (if less than completely precise) *ex ante* standards in New Zealand may nevertheless be potentially efficiency-enhancing. A key to understanding this result lies in the imperfect detection by DOL of breaches of the *ex ante* standard.

In Figure 1, with a probability of detection of breach of the *ex ante* standard of less than one, the slope of the locus of points depicting the level of care against the level of *ex ante* regulation is less than one, as illustrated by the locus $x^0 = \tilde{x} + \alpha s$, $0 < \alpha < 1$. The locus $x^0 = s$ illustrates the argument of Kolstad et al., with under-precaution in the absence of *ex ante* standards at $\tilde{x}$. As the level of the *ex ante* standard is raised, the employer's choice of care increases at the same rate. But with employers now assigning a less than unitary probability of detection and prosecution, the choice of care levels no longer increases at the same rate as the increase in the *ex ante* standard. The choice of care locus $x^0 = \tilde{x} + \alpha s$ intersects the locus $x^0 = s$ below x^*, and so the optimal *ex ante* standard will exceed not only s^* but also x^*. The strict *ex ante* standard embodied in the Act may be close to the socially optimal *ex ante* standard when the assumption of perfect enforcement is relaxed.[44]

Empirical evidence has shown that firms perceive a very real probability of non-detection of deficient care.[45] In Section 2 above, we noted the limited detection rates in New Zealand. Thus, employers would consequently significantly discount penalties associated with convictions for breaches of quite stringent *ex ante* safety standards. The resulting expected penalty arising from detection of breaches of *ex ante* standards, however, may still generate an appropriate deterrent to under-

[43] Figure 1 illustrates this argument. With a strict *ex ante* standard at $\hat{s}$, say, the employer's choice of care will be over-precautionary at $\hat{x}$.
[44] Thus, it is possible that the standard of "all reasonably practicable steps" has better justification for the *ex ante* liability rule than for the corresponding *ex post* rule, and the result also illustrates the Court's view that approved codes may contain requirements that do not have to be met in order to meet the required standard of care; see *Central Cranes*, supra, fn. 19.
[45] See Chapple and Mears (1996, s 3.2) for a survey of this literature.

compliance rather than inducing over-compliance, although such an argument requires a considerable leap of faith. Given the stringency of New Zealand's safety standards, however, and given that the appropriate level of *ex ante* standards should not lie above the common law level of due care when detection is certain, inspection rates must lie well below 100 percent as indeed they do.

6. *Ex Post* Liability and the Standard of Care

In section 5 above, we argue that relatively stringent safety standards in New Zealand may have useful incentive-enhancing properties, particularly where there is considerable uncertainty surrounding the Court's interpretation of the required standard of care. In this section, we illustrate why we believe that uncertainty is a serious issue. First, the *ex post* liability rule is based on the same care standard as the general rule that underpinning New Zealand's safety regulations, viz, "all reasonably practicable steps" to ensure workplace safety.[46] Arguably, such a standard is likely to

[46] Thus, the standard of care in respect to *ex post* liability is also relatively stringent compared to a negligence rule. In this context, consider *Department of Labour v Contract Machinery* [2000] DCR 749, where the defendants successfully made out a defence that they had acted without fault. The judgment indicates that this proof was by the smallest of margins, thus appearing to give an unusually clear indication of where the Courts are willing to draw the line in the sand. An employee was overcome by carbon monoxide fumes as a result of operating a petrol-powered concrete cutting machine. The cutting was carried out inside a concrete well, which was held by Noble J to be a confined space. In defence, it was argued that the well was adequately ventilated, reliance having been placed on the fact that council workers had entered the well in the past to carry out maintenance, and that it was designed as a place of work. The use of a petrol-driven saw was not considered a hazard. After only an hour or so of cutting on the second day, the employee stopped work and was treated in hospital for carbon monoxide poisoning. Contract Machinery was charged under s 6 for failing to take all practicable steps to ensure the employee's safety by ensuring he was not overcome by exhaust emitted by the saw. The Judge accepted that the failure was a mistake, as the build-up of carbon monoxide was not anticipated, and noted that if the prosecution proved there was a failure to take all practicable steps a conviction would result unless the defendant could prove on the balance of probabilities the failure to take all practicable steps occurred without fault or that the employer acted as any reasonable employer would have acted in the same circumstances. The Judge considered the practicable steps that could have been taken, indicating in each case that they were either not reasonably practicable, or that the purported practicable steps gave rise to further hazards, and concluded that the company had taken full and extensive steps to comply with the Act. Given that countervailing hazards would have arisen from the adoption of a different approach to the job, the Judge indicated that "the duty to take all reasonably practicable steps is not a counsel of perfection to be exercised with the benefit of hindsight" and was satisfied that the company had "acted in the circumstances as any responsible and reasonable employer would have acted." The factors that were

be much less precise than the corresponding negligence standard. Under the latter, court errors in assessing x^* might typically be modest so that the effect of uncertainty is to induce a moderate level of over-precaution even in the absence of safety standards. Under a requirement of "all reasonably practicable steps", however, employers may make large prediction errors concerning the court's assessment of levels of care that would absolve employers from liability, with a corresponding incentive to take too little precaution.

While the test in *Edwards* suggests a higher standard of precaution than under a negligence rule, the looseness in the concept of "gross disproportionality" between costs and benefits of safety precautions serves to increase the degree of uncertainty surrounding legal standards of care. Employers may at times wrongly believe that the Courts will deem costs of precaution excessive and hence absolve them from these precautions. This is particularly likely to be the case if the Courts modify their position over time by strengthening their interpretation of the required standard of care and employers fail to anticipate this.[47] Employers may also wrongly believe that the Courts will find them in breach of duty even when costs are high relative to benefits, and yet elect to take relatively low levels of precaution and face occasional prosecution rather than bear these costs. The Courts and employers face different information concerning the accuracy of estimates of expected costs and benefits.

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favourable to Contract Machinery were their excellent approach to issues of health and safety and the countervailing hazards. Nevertheless, the Judge did not conclude that the employer failed to take all practicable steps, and appears to merge the defence of lack of fault with a finding as to whether all practicable steps had been taken. The two tests are similar, however, as *Edwards* indicates a step is not practicable where a risk is insignificant given the cost involved to reduce the risk. In the same way, where a risk is insignificant a reasonable employer would not take steps to mitigate the risk. Penalties awarded under s 50 are imposed under strict liability, the only defence being a lack of fault. The defence will only be applicable where the prosecution has made out all of the elements of the offence. Consequently, even in this case, the waters remain somewhat muddied.

[47] For example, the decision in *Department of Labour v Central Cranes Ltd* [1996] 2 ERNZ 199 (HC) is a case in point. Mazengarb (2000, para. 6018.7) warns against the applications of the earlier decisions in the light of this judgement in terms of hiring competent contractors. Thus, "stricter precautions may be necessary".

Employers will be expected to possess much more accurate information on expected costs and benefits that are typically specific to their particular operations. The Courts cannot be expected to possess more than general information, and while both prosecution and defence may supply relevant evidence, their respective interests are conflicting and so may be the nature of their evidence. Thus, the Courts' assessment of costs and benefits, especially with regard to changes in the likelihood of serious harms, may not necessarily be accurate.

By way of illustration, consider the following two appeal cases. In *Burrell Demolition v Department of Labour*, a demolition contractor was charged with failing to take all practicable steps to ensure the safety of an employee operating a Halitrax tracked skid steer machine.[48] The operator acted in breach of basic safety rules and exited the machine while the engine was running and upon re-entry, became wedged between the cab and the bucket. The trial judge accepted the prosecution position that protective side screens should have been fitted to the (rented) equipment to prevent an operator placing a part of their body in the path of an hydraulic arm, feeling that the risk of harm was not entirely speculative in spite of the injury sustained not being provided for under the relevant code of practice. On appeal, however, Salmond J considered that there was inadequate evidence suggesting that the firm knew, or ought to have known, about the risk of serious harm. Halitrax machines were generally regarded as safe without the fitting of side screens. No such machines had side screens fitted for any purpose, and their fitting would impair the vision of operators when reversing. Although common practice might not be a suitable defence in particular circumstances, normal operation during the task at hand did not require the operator to lean out of the cab for any reason, and the appeal was allowed. This

[48] Supra, fn. 19.

different assessment of the same facts and what determines speculative risks of harm by the judiciary is a clear example of the considerable uncertainty facing employers in their decisions.

Next, consider *Department of Labour v Solid Timber Building Systems New Zealand Limited*.[49] In the trial hearing, Solid Timber was charged with failing to take all practicable steps to ensure that an employee was not exposed to hazards arising out of the use of a finger jointer machine. It was accepted that the machine in question was relatively safe compared to available alternatives, that Solid Timber had in place active occupational safety and health policies, had previously sought advice from OSH officials on health and safety matters, had employed a health and safety consultant in an advisory capacity, and had provided satisfactory operational training. A worker, however, was injured when his hand came in contact with an alleged insufficiently guarded spindle blade while using the machine in a manner contrary to instructions and which exposed the worker to risks that would not have existed had the machine been switched off while he cleared sawdust (an action which the worker had previously undertaken for such operations). An engineer for the informant gave evidence that in his opinion the machine was insufficiently guarded, and Harding J considered that the spindle blades were a plainly identifiable hazard and that the costs of increased guarding were achievable at reasonable cost. Nevertheless, the judge dismissed the charge on the grounds that following the taking of considerable expert advice, the company had been wrongly led to a belief that it was meeting its safety obligations, and could do no more than it had done. Further, the acknowledged experts were criticized for their expertise being inconsistent with "common-sense", a

[49] Unreported, HC Rotorua, 7 November 2003, AP 464144/2003.

position supported by Baragwanath J who allowed the Crown's appeal against the dismissal of the charge, a conviction subsequently being entered.

How can there be such a difference in perception between safety experts and a judiciary that implicitly endows itself, if not several safety experts on one side of the case, with "common-sense"? Some insight may be gleaned from the judgments in this case. In the Act, taking all reasonably practicable steps must have regard to the nature and severity of harm, and the judicial view was put by Harding J as being "plainly obvious to all that potential harm from persons coming into contact with spindle blades or saws is significant". A second factor is the current state of knowledge about the likelihood that harm of a particular nature and severity will be suffered, to which similar comments were held to apply. The Judge, however, presumably refers to knowledge concerning the nature and severity of harm conditional on an accident occurring rather than the *ex ante* expected harm during regular use of such machinery. It is not disputed that accidents involving insufficiently guarded saws and the like typically involve serious injuries, and surely all health and safety experts comprehend this at least as well as the judiciary. An important issue is the frequency of such accidents given all the circumstances prevailing. In the two judgments, the only direct reference to this matter was that inquiries had revealed that there was no known history of previous accidents involving the particular type of machine which was at least 40 years old, and perhaps more than 50 years old. The Judge rebuked safety experts who claimed desirable safety attributes for the machine, the proof being in the pudding. What appears to be the case, however, is that if there was no need for operators to go near the cutters of the machine, specific instructions not to go near the cutters had been laid down, if those instructions had been followed then no accident would have occurred, and if

such instructions were common practice over a sustained period and had typically been followed by operators in all locations, then the accident must be considered to be an extremely low probability event with correspondingly low expected accident costs. The judgments also acknowledge that the operator should not have been reaching into the relevant moving parts.[50]

What seems critical, however, is the statement by Harding J that "the whole tenor of the legislation is to protect people if necessary from themselves", that is, from seemingly impulsive or irrational actions from even well-trained workers. Such alleged behaviour may not be so, however, if there are large, random, and very temporary (typically unverifiable) shocks in the costs of care function for employees or if a small proportion of workers are not risk-averse.[51] This might explain the rarity of accidents involving this particular type of machine. In these circumstances, only sustained voluntary exposure to obvious hazards might be interpreted as employee negligence, but the distinction may be very difficult to draw in practice since employees have an incentive to argue that their conduct is non-negligent in order to minimize the own liability under the Act, and their cost of effort functions is likely to

[50] Regarding employer uncertainty about the Courts' assessment of risk, compare the decision in *Solid Timber* with *Department of Labour v Highway Transport Services*, unreported, DC Hamilton, 25 May 2005, CRN 04019501737. The latter case concerned a fatal accident involving a wall-mounted gantry boom coming into contact with a rising forklift mask in a combination of highly idiosyncratic circumstances that the Court ultimately held not to be reasonably foreseeable, and dismissed the charge. But if the risk had been foreseen, the defendant company would most likely have been liable since the cost of avoiding the (negligible, but clearly nonzero) risk was small in this case.

[51] Thus, in *Moore* (supra, fn. 2), Panckhurst J argued that it is both "notorious" and "inevitable" that "individual employees will have moments of carelessness or lack of attention to detail". Notably, compensation for earnings loss in the event of injury is sufficient to leave significant residual moral hazard with respect to employee care decisions. Further, penalties for what appear to be large deviations from the practicable steps standard for employees are typically a small fraction of those imposed on employers for similar deviations. For example, in *Department of Labour v Rahauhi* [2002] DCR 703, the defendant employee pleaded guilty to a charge of failing to take all practicable steps to prevent harm to other persons when a diving student suffered decompression sickness. Applying the *de Spa* principles, culpability was seen as moderate even though the harm suffered was not caused by the employee. It was held, however, that there existed a high risk that the student may have drowned as a consequence of the employee's actions. The Court, however, made a specific distinction between employees and employers on the hierarchical system of responsibility under the Act, and imposed a fine of only $1,750 (reduced to $1,250 because of the employee's financial circumstances). There is no mention in the decision as to whether the employer was also liable under the Act.

be private information to them. In the event, no charge was brought against the injured worker. Although the trial judgment makes reference to the fact that the injured worker had been hired under a scheme to promote employment for disabled workers, the disability in this case being restricted movement, this issue was not directly addressed in determining cause. The machine had jammed twice prior to the accident, and the worker chose not to switch off the machine when it jammed a third time. Given the movement disability, the decision not to do so may have reflected a large increase in the cost of such movement, and given that the machine jammed intermittently, there may have been a cost-benefit argument in favour of the company providing additional guards for this particular worker, if not all workers. The Judge, however, makes it clear that idiosyncratic workers are not to the forefront of his thinking, in that in his view it is "entirely improper to conclude that persons will simply do as they are told and keep away from plainly dangerous parts".

In sum, employers appear to be required to make their workplaces highly resilient against a vast array of vagaries of human nature, even if they are highly unlikely to occur. Given the huge range of manifestations of potential transient 'aberrations' from careful conduct by employees, it is perhaps not surprising that some employers continue to offend even when the costs of avoiding accidents resulting from each individual aberration are relatively small. Continuing offences are most likely when penalties are weak (even when harms are extremely serious), where required standards of care might typically be considered excessive if employees always took suitable levels of self-protection, and where employers are highly uncertain as to the Courts' interpretation of what constitute 'significant' risks.

7. Concluding Remarks

New Zealand's Health and Safety in Employment Act 1992 imposes statutory duties on both employers and employees with regard to workplace safety. The Courts have clearly emphasized that the major initiatives regarding workplace safety lie with employers, who are required to take all reasonably practicable steps to ensure the safety of their employees. In addition to penalties for breach of duties in the event of accidents, employers also face penalties when workers are deemed to be exposed to excessive risks but where no accident has occurred. While *ex ante* liability may substitute for *ex post* liability, *ex ante* standards may also be effective in complementing *ex post* liability rules where it is believed that the latter are insufficient on their own to induce appropriate levels of care by employers. *Ex ante* standards then flag the minimally acceptable level of precaution, thereby reducing the dilution in incentives to take care arising from uncertainty surrounding the standard of care required by the Courts when implementing *ex post* liability rules.

While the literature suggests that *ex ante* standards should be lower than corresponding socially optimal precaution levels, we argue that more strict standards may be required where inspection probabilities and prosecution rates for *ex ante* breaches are relatively low, as is observed in the enforcement of the Act. Further, penalties are set at relatively low levels, in large part a response to the Act's imposition of relatively low (but increasing) caps on fines along with a desire by the Courts to leave some margin for deterrence in respect of very serious accidents along with rewards for otherwise satisfactory conduct. Given that the detection rate of breaches of the *ex ante* standard is likely to lie well below one, and given that the vast majority of Department of Labour *ex ante* interventions that detect breaches do not result in prosecution, expected liability where accidents do not arise is anticipated to

lie well below expected liability when accidents do arise unless fines are significantly larger for the former than the latter. The pattern of fines for offences not involving accidents, however, appears significantly smaller than for similar offences where employee harm occurs.

While aspects of *ex ante* safety standards appear potentially efficiency-enhancing, the following points should be noted. First, uncertainty surrounding the interpretation of the existing required standard of "all reasonably practicable steps", especially with respect to whether a particular step is practicable in the particular circumstances examined in litigation, is likely to be large because of its imprecise nature. A defendant can safely reject a "practicable step" only if there exists a gross disproportion between the magnitude of risk reduction and the cost of reducing that risk. Employer uncertainty surrounding what constitutes a "gross disproportion" in particular circumstances is likely to be considerably greater than the uncertainty surrounding the interpretation of the negligence rule of equality of marginal costs and benefits of risk reduction. Thus, a weaker but less uncertain standard may induce a small degree of overprecaution rather than significant under-precaution, rendering otiose the need for *ex ante* safety regulations from this particular perspective. Second, the general care standard is interpreted stringently by the Courts. While the effect of this interpretation may be to (partially) offset the effect of low penalties, it need not be so. In some cases, *ex ante* interventions based on information provision, persuasion, and threats fail to induce compliance and it is cost-effective for an employer to accept liability risk rather than meet the standard of care. A less stringent standard involving a higher level of care than that observed to be chosen by these employers, however, might well have been met. Third, while the Act represents a major attempt to avoid the re-creation of a plethora of specific regulatory constraints, the presence of

regulations, approved codes of conduct and guidelines make it clear that stringent, but, in the minds of many employers, imprecise *ex post* standards, are considered insufficient in their own right to induce desired safety behaviour.[52] Complicating this issue is that the general *ex ante* standard, which predicates many specific regulations, are the same as for *ex post* liability. Their stringency, in the circumstances, may be commendable on second-best grounds, although the uncertainty surrounding their interpretation is an unfortunate side-effect. Reducing uncertainty by reintroducing a raft of highly specific regulations, however, would seem to defeat the intention of the Act to largely do away with such an approach.

Finally, this article treats employee levels of care much as the Act does, i.e., as a second-order issue. In particular, where accidents occur and both employers and employees are in breach of their statutory duties, employee breach serves mainly to mitigate employer liability without affecting employee liability given that accident compensation payments are independent of an accident victim's level of care. This effectively decouples penalties in that a given liability is shared between the parties on the basis of their respective deviations from their required standards of care, with liability shares summing to less than1. With uncertain care standards, however, a more efficient approach may be to relax the constraint on the parties' respective liability shares somewhat[53], while recognizing that accident compensation permits desirable risk-shifting for risk-averse employees. Further, efficiency may also be enhanced by finding cost-effective means to prevent some employees occasionally

[52] Note that the Ministerial Panel on Business Compliance Costs Recommendation 53 requires OSH to work more closely with business and provide clearer guidelines on complying with the Act; see http://www.med.govt.nz/templates/MultipageDocumentPage_6334.aspx.

[53] This contrasts with Cooter and Ulen (1986) who argue in favour of a comparative negligence rule. Without liability sharing, the costs of uncertainty are concentrated on one or other party, with serious adverse incentive effects for the non-liable party. Adjusting the shares of a given liability, however, typically reduces adverse incentives for one party while worsening the incentives for the other. A decoupling rule that provides for liability shares to sum to more than is currently permitted relaxes a constraint and helps to attenuate adverse incentive effects.

taking care levels that appear to be hopelessly inadequate. Arguing in favour of stringent safety regulations in order to counter socially suboptimal underprecaution by employers is one thing; arguing in similar vein to induce socially suboptimal overprecaution for employers (given occasional suboptimal underprecaution by a few employees) is a different matter. Looming over the HSE Act is the financial responsibility of the State for the bulk of the hospital care costs associated with workplace injuries. To date, the emphasis has been on trying to induce employers to protect their workers against themselves as well as against defective standards of care by employers, and, given the (limited) available information on accident rates and related data,[54] it is yet to be demonstrated that the approach has been a resounding success.

[54] See Gordon and Woodfield (2006) for a summary and review of this data.

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